

Mole \leftrightarrow Grams, Mole \leftrightarrow Molecules, Grams \leftrightarrow Molecules Conversions

There are three definitions (equalities) of mole. They are:

$$1 \text{ mole} = 6.02 \times 10^{23} \text{ particles}$$

$$1 \text{ mole} = \text{molar mass (could be atomic mass from periodic table or molecular mass)}$$

$$1 \text{ mole} = 22.4 \text{ L of a gas at STP (You do not need to worry about this yet)}$$

Each definition can be written as a set of two conversion factors. They are:

$$1 \text{ mole} = \text{molar mass(g)} \text{ can be written as } \left(\frac{1 \text{ mole}}{\text{molar mass (g)}} \right) \quad \text{OR} \quad \left(\frac{\text{molar mass (g)}}{1 \text{ mole}} \right)$$

$$1 \text{ mole} = 6.02 \times 10^{23} \text{ particles can be written as } \left(\frac{1 \text{ mole}}{6.02 \times 10^{23}} \right) \quad \text{OR} \quad \left(\frac{6.02 \times 10^{23}}{1 \text{ mole}} \right)$$

What are the molecular weights of the following compounds?

- 1) NaOH 2) H₃PO₄ 3) H₂O 4) Mn₂Se₇ 5) MgCl₂ 6) (NH₄)₂SO₄

Make the following Conversions Show all work on separate sheet of paper:

- 1) How many **moles** are in 15 grams of lithium?
- 2) How many **grams** are in 2.4 moles of sulfur?
- 3) How many **moles** are in 2.2×10^{20} molecules of argon?
- 4) How many **grams** are in 88.1 moles of magnesium?
- 5) How many **molecules** are in 2.3 moles of phosphorus?
- 6) How many grams are in 11.9 moles of chromium?
- 7) How many molecules are in 9.8 grams of calcium?
- 8) How many grams are in 238 moles of arsenic?
- 9) How many grams are in 4.5×10^{28} molecules of sodium fluoride, NaF?
- 10) How many moles are in 98.3 grams of aluminum hydroxide, Al(OH)₃?
- 11) How many grams are in 0.02 moles of beryllium iodide, BeI₂?
- 12) How many moles are in 68 grams of copper (II) hydroxide, Cu(OH)₂?
- 13) How many grams are in 3.3 moles of potassium sulfide, K₂S?
- 14) How many molecules are in 1.2×10^3 moles of ammonia, NH₃?
- 15) How many grams are in 2.3×10^{-4} moles of calcium phosphate, Ca₃(PO₃)₂?
- 16) How many moles are in 3.4×10^{-7} grams of silicon dioxide, SiO₂?
- 17) How many grams are in 1.11 moles of manganese sulfate, Mn₃(SO₄)₇?